

November 26, 2021

Mr. Robert Le

Attorney at Law

826 SE Third AVE, STE 302

Portland, Oregon 97214

Dear Mr. Le:

As requested, I have prepared additional analysis and explanation for you in response to the motion to strike document you have provided. The references I have provided add further support for my opinions, all of which are also based on my education, training, and extensive experience. I selected these references based on their authority, ease of understanding, and accessibility. If you or the Court require any further detailed explanation, information, or supportive documentation, I am available at your convenience. Furthermore, it may be worth noting that when I use the term opinion, I mean scientific/medical opinion. Scientific/medical opinion is evidence-based and supported by published, peer-reviewed research and experience. Scientific/medical opinion is not the same as having an opinion in colloquial use of the term.

I. Regarding my qualifications as an expert

I meet the American College of Emergency Physicians (ACEP) definition of an expert in the field of emergency medicine (document attached for your reference; most recent update June 2021). I have been a member of ACEP since July 2001. Emergency medicine is a specialty with broad expertise that encompasses most fields of medicine. I am expert at the evaluation and treatment of cardiac and neurological conditions that are encountered in the emergency department (ED), including loss of consciousness and its causes. A physician does not need to be a cardiologist or neurologist to be an expert at the evaluation and treatment of loss of consciousness (LOC) or syncope or other diagnoses in the differential of LOC. In fact, emergency physicians would argue that the initial evaluation of these complaints should be performed by an emergency medicine physician with broad experience to avoid availability bias (see note 1). In the ED, most cases involving a of loss of consciousness are diagnosed and treated by the emergency physician without involvement of any consultants. Loss of consciousness is a frequent ED complaint. I estimate that have evaluated and treated at least 1000 patients after loss of consciousness (see note 2).

Obstructive sleep apnea (OSA) is frequently encountered in the emergency department. OSA complicates the management of patients with respiratory compromise, altered level of

consciousness, and many other medical conditions. Before sedation, which happens daily in the ED, we must enquire about OSA since it can have significant negative effects if not expertly managed. We are experts at airway management. It is not unusual for emergency physicians to recognize OSA in a previously undiagnosed patient and refer them for sleep study so they can obtain confirmation and CPAP, the treatment for OSA. Emergency physicians are expert at managing CPAP, and it's more sophisticated version, BiPAP, in the ED where it is used for a variety of medical conditions.

The prevalence of OSA in the general population "in North America is approximately 15 to 30 percent in males and 10 to 15 percent in females, when OSA is defined broadly as an apnea-hypopnea index (AHI) greater than five events per hour of sleep" (UpToDate, OSA epidemiological section). Based on these numbers, I have evaluated at least 3000 men with OSA in the emergency department (see note 3).

II. Regarding the usage of the term syncope

The inaccurate use of the term syncope by medical professionals to improperly describe any transient loss of consciousness (TLOC) is a common problem in medicine. I have personally encountered this problem many times with nurses, paramedics, and physicians. Sometimes the problem arises from poor history taking. Other times, there is diagnostic uncertainty or providers are simply not precise in their usage of medical terminology. The inaccurate and imprecise use of medical terminology among physicians is a problem with many other diagnostic terms as well. For example, Dr. David R Pettersson, the radiologist who read Mr. Doherty's CT spine, stated that the study indicated "findings of prior gastric bypass surgery." when in fact he had gastric sleeve surgery not gastric bypass.

I would further refer you to UpToDate. UpToDate is an evidence-based, on-line, authoritative medical reference commonly used by physicians across disciplines. It is the standard reference used at my institution and it is imbedded in the electronic medical record. I referenced this resource in preparing this document and I think you would find it to be valuable resource. This is meant to be a summary, so I only included a few of the references cited to by the authors of UpToDate, but I am happy to provide them all upon request. The section on syncope taken directly from the current version states:

Syncope is a clinical syndrome in which transient loss of consciousness (TLOC) is caused by a period of inadequate cerebral nutrient flow, most often the result of an abrupt drop of systemic blood pressure. Typically, the inadequate cerebral nutrient flow is of relatively brief duration (8 to 10 seconds) and, by definition, syncope is self-limited. Unfortunately, the term "syncope" is often misapplied to encompass any form of abrupt collapse which may or may not be accompanied by TLOC; this broad and less-specific usage should be avoided [citation 1].

My assertion that the term syncope is often misused is further supported by the defense expert opinion statement. Dr. Yakovlevitch makes the mistake of equating syncope and loss of consciousness. Please refer to the follow statements:

Syncope refers to a loss of consciousness, which results in both a loss of sensory perception as well as a loss of motor control.

Syncope can affect anyone, and many people have lost consciousness at some point in their lives.

Furthermore, he lists seizure as a cause of syncope (second bullet point). Seizure is not a cause of syncope. Many seizures cause loss of consciousness, but the mechanism is not decreased blood flow to the brain, so seizure is not a cause of syncope. These statements demonstrate that Dr. Yakovlevitch is not using the medical terminology for syncope accurately or precisely.

III. Regarding the diagnostic process

When evaluating a patient that has lost consciousness while driving, it is essential for an emergency medicine physician to determine the cause of that loss of consciousness, when possible, not simply to diagnose and treat injuries that occurred. Emergency physicians are required by law to notify law enforcement if they suspect a driver was impaired or intoxicated by alcohol or other drugs. The Oregon DMV requires reporting of a driver suspected to be impaired by a medical condition. Furthermore, medical problems both previously known and unknown to the driver can contribute to loss of consciousness requiring further evaluation and treatment to prevent further morbidity (for example a diabetic experiencing hypoglycemia or a patient taking blood pressure medications experiencing a side effect).

The process for making a diagnosis after a patient experiences a loss of consciousness is the same as for any other undefined medical condition and is based on the scientific method. It is part of the standard training for all medical students. The process requires medical training and experience and cannot be performed by a layperson. We begin by formulating a differential diagnosis, which is a list of possible diagnoses based on the complaint. The history, exam, and testing are structured to then rule out diagnoses that could not have caused the loss of consciousness in a particular case. Based on my education, training, and experience, my differential diagnosis for a patient with transient loss of consciousness includes syncope, seizures, head trauma, drug/medication intoxication, metabolic disturbances, sleep disturbances, and psychiatric illnesses. This differential is supported by the literature. Again, I refer you to the UpToDate section on syncope:

When caring for patients who present with TLOC/collapse, it is also important to consider causes that are not syncope. Examples of nonsyncopal causes of TLOC or apparent TLOC include:

- Seizures. (See "Evaluation and management of the first seizure in adults".)
- Sleep disturbances, including narcolepsy and cataplexy.
- Accidental falls or other incidents resulting in traumatic brain injury (ie, concussion).
- Intoxications and metabolic disturbances (including hypoglycemia).
- Some psychiatric conditions (eg, conversion reactions resulting in psychogenic pseudosyncope or pseudoseizures, with the latter termed "nonepileptic seizures" by some neurologists). (See "Nonepileptic paroxysmal disorders in adolescents and adults".)

I next examined the evidence you provided to narrow my differential. I excluded trauma since he reported no trauma before the accident. I excluded seizure because there was nothing in the patient's history or laboratory testing to suggest seizure. He was not post-ictal, and seizures that cause LOC last more than a few seconds. I excluded intoxication as his testing was normal. I excluded hypoglycemia, carbon monoxide poisoning, and other metabolic disturbances as his testing ruled this out. There is no reason to believe that this was psychiatric in nature. This leaves syncope and sleep disturbances.

Syncope is not suggested by the deposition history of Mr. Doherty you provided. Syncope, or transient loss of consciousness due to decreased perfusion of the brain, is preceded by a constellation of symptoms called a prodrome. The prodrome is due to brain perfusion falling, but not to the level of inducing unconsciousness. A criticism was made that my previous report "cherry picks" symptoms and that I did not do an investigation as to whether they were present. The syncope prodrome of symptoms is not controversial. It is well recognized and is a basic component of medical education. His deposition history tells me that none of these symptoms were present. A review of medical literature supports the list of symptoms. Here is UpToDate on syncope prodrome:

The classic prodromal symptoms associated with imminent syncope and presyncope, particularly in the case of the vasovagal form of reflex syncope, include:

- Lightheadedness
- A feeling of being warm or cold
- Sweating
- Palpitations
- Nausea or nonspecific abdominal discomfort
- Visual "blurring" occasionally proceeding to temporary darkening or "white-out" of vision
- Diminution of hearing and/or occurrence of unusual sounds (particularly a "whooshing" noise)

- Pallor reported by onlookers

On rare occasions, syncope can occur without prodrome, most commonly from arrhythmia (abnormal heart rhythm). However, arrhythmia was not found on EKG testing or Holter monitor evaluation. Furthermore, as Dr. Yakovlevitch points out, Mr. Doherty's electrolyte levels were normal, and his cardiac ultrasound was normal, so he is not at increased risk for arrhythmia.

Syncope most often has a trigger. For example, a person who is dehydrated stands up, the blood pressure drops, leading to prodrome symptoms and LOC. This is called orthostatic syncope and he had no triggers or risk factors for this. Syncope can be triggered by an emotional or stressful experience, for example the sight of blood. This triggers a reflex that slows the heart and is called vasovagal syncope. Vasovagal syncope is the most common type of syncope. There are many other triggers for vasovagal syncope; none are present in Mr. Doherty's history.

My assertion that the patient did not have a trigger for syncope is supported by Dr. Yakovlevitch who wrote:

there is no evidence to suggest that Mr. Doherty did anything either actively or through omission to contribute to the episode

Having ruled out syncope and other causes, sleep disturbance is the only category left on my differential list. The most relevant abnormal conditions for this category would be drowsy driving/falling asleep at the wheel, narcolepsy, and cataplexy. Narcolepsy is a chronic sleep disorder characterized by sudden attacks of sleep, which he has not had based on his history. He also did not experience cataplexy, a chronic condition involving sudden loss of muscle tone but not consciousness, triggered by strong emotions. Both conditions are rare. The prevalence of narcolepsy is 25-50 per 100,000 people (citation 2). I estimate I have seen approximately 20 patients with a diagnosis of narcolepsy.

This leaves falling asleep as the only diagnosis I cannot rule out.

The next step is to re-evaluate the evidence to determine if it supports or contradicts this conclusion. His deposition history supports a conclusion that he fell asleep. He has risk factors for drowsy driving and drowsy driving is a common problem (see below). When I examine the evidence, it supports my conclusion that he fell asleep while driving.

IV. Regarding risk factors for drowsy driving

Mr. Doherty has several risk factors for drowsy driving. He is at increased risk for OSA based on his BMI (see section regarding BMI calculation below) and he is a commercial driver. The prevalence of undiagnosed OSA is high. One study found that over 80% of patients at high-risk

for OSA had the disease and were undiagnosed (citation 3). OSA is a significant risk factor for drowsy driving. Furthermore, and importantly for this case, the absence of subjective sleepiness does not eliminate the risk of falling asleep while driving.

Here is what UpToDate has to say in the section titled: Drowsy driving: Risks, evaluation, and management.

Sleep apnea and other sleep disorders — OSA increases the risk of crashes by two- to threefold [35,36]. In a meta-analysis of 16 observational studies, most of which were retrospective, the relative risk of crash in patients with OSA compared with controls was 2.4 (95% CI 1.2-4.9) [37]. The most consistently identified factors associated with increased risk were body mass index, apnea-hypopnea index, and severity of hypoxemia. The presence of daytime sleepiness predicted risk of crash in some studies but not others, indicating that the absence of subjective sleepiness does not eliminate risk. Additional risk factors include advanced age and concomitant use of alcohol or sedatives. Laboratory-based studies have shown impaired psychomotor vigilance and driving simulator performance in patients with untreated OSA [23,38]. In one study, performance of patients with mild to moderate untreated OSA was worse than those with a blood alcohol concentration of 0.06 percent [23]. These effects can be seen in patients with and without daytime sleepiness and are magnified by concurrent use of alcohol or sedatives [38,39].

Commercial drivers — Commercial drivers have been identified as a high-risk group for drowsy driving and its consequences [47]. Contributing factors include sleep deprivation, overnight driving (at a time of peak sleep propensity), and high rates of comorbid OSA. The National Transportation Safety Board in the United States estimates that drowsy driving is responsible for more than half of all crashes in which the operator of the truck is killed [48]. Large truck crashes account for nearly 4000 deaths and 100,000 injuries per year in the United States, and approximately three-quarters of those injured or killed are occupants of other vehicles [49].

Sleep deprivation and self-reported drowsy driving is common in commercial drivers. In a poll of transportation workers, 20 percent admitted to driving a private vehicle while drowsy in the prior month [50]. Another study found that 14 percent of long-haul commercial truck drivers sleep for an average of less than five hours per day [51]. Train operators as a group had the highest rates of self-reported drowsy driving, with 39 percent admitting to driving while drowsy at least once in the prior month.

OSA is a common cause of daytime sleepiness and a known risk factor for drowsy driving and crashes. The reported prevalence of sleep apnea in commercial truck drivers is very high, ranging from 28 to 80 percent [52-55]. This high prevalence is probably because commercial truck drivers are disproportionately male, middle aged, and obese. (See 'Sleep apnea and other sleep disorders' above.)

Commercial drivers may require a higher standard for assessing medical fitness to drive compared with passenger car drivers [56], based on the fact that crashes involving commercial vehicles are more likely to result in the death of others on the road and carry a high cost [49,56-58]. (See 'Evaluation of drowsy drivers' below.)

In the United States, a Joint Task Force of the American College of Chest Physicians, the American College of Occupational and Environmental Health, and the National Sleep Foundation has recommended that OSA testing be performed in commercial truck drivers with body mass index (BMI) $\geq 35 \text{ kg/m}^2$ [citation 4]. From UpToDate.

Mr. Doherty has other conditions associated with OSA, specifically hypertension treated with propranolol and vitamin D deficiency. There was concern that I did not mention his vitamin D level in my opinion. The records you provided from OHSU indicate it was 10.9 ng/ml, which is in the deficiency range (<20) by their lab.

Finally, Mr. Doherty has a history of bariatric surgery (gastric sleeve also called sleeve gastrectomy). BMI of 35 or higher with OSA is one of the indications for surgery.

Per OHSU (<https://www.ohsu.edu/bariatric-services/considering-bariatric-surgery>)

You may be a candidate for surgery if you:

- Have a BMI higher than 40.
- Have a BMI of 35 or higher with one or more obesity-related condition, such as:
 - Arthritis
 - Type 2 diabetes
 - Heart disease
 - High blood pressure
 - High cholesterol
 - Sleep apnea

V. Regarding the term diagnosis

A question was raised as to whether Mr. Doherty falling asleep while driving is a medical diagnosis. A diagnosis is simply the explanation for the problem. The term diagnosis is not synonymous with disease or illness. For example, pregnancy is a common diagnosis to explain a host of symptoms that are part of a natural human condition. Pregnancy is not a disease or illness, but it is certainly a diagnosis. I would refer you to the Merriam-Webster Dictionary, which states (www.merriam-webster.com/dictionary/diagnosis):

Essential Meaning of *diagnosis*

1: the act of identifying a disease, illness, or problem by examining someone or something

The unusual combination of symptoms made accurate *diagnosis* difficult. She is an expert in the *diagnosis* and treatment of eye diseases.

2: a statement or conclusion that describes the reason for a disease, illness, or problem

The *diagnosis* was a mild concussion. His doctor made an initial *diagnosis* of pneumonia. The committee published its *diagnosis* of the problems affecting urban schools.

In this case, I have concluded, based on my education, training, and experience, that the best diagnosis for the problem that occurred is falling asleep at the wheel.

VI. Regarding BMI calculation

Concern was raised that Mr. Doherty's BMI was 34.9 and not 35 as I reported. His weight was listed as 250 pounds and height 71 inches. I used MedCalc, an authoritative and common application. This results in a BMI of 34.9 kg/sq m. However, this must be rounded to a whole number since the calculation is the product of two measured whole numbers (250 and 71). It is a basic scientific principle that the result of a calculation cannot be reported with more precision than the measurements.

Whether his BMI is 34.9 or 35 doesn't really make a difference in formulation of my opinion. At the time of the accident, Mr. Doherty had a BMI well over 30, which is how we define obesity, and it confers a substantial increase for risk of moderate to severe OSA verses patients with ideal body mass. According to UpToDate (emphasis added):

Obesity – The risk of OSA correlates well with the body mass index (BMI) [5,14]. In one study, a 10 percent increase in weight was associated with a six-fold increase in risk of OSA [17]. In another study, moderate to severe OSA (apnea-hypopnea index [AHI] ≥ 15) was present in 11 percent of men who were normal weight, 21 percent who were overweight (BMI 25 to 30 kg/m²), and 63 percent of those who were obese (BMI >30 kg/m²) [citation 5].

VII. Regarding the unusual lights

I would like to clarify my statement about the unusual light phenomenon Mr. Doherty describes. I don't think this was a seizure aura, based on my extensive evaluations of patients with seizure disorder, and there is no evidence he had a seizure. Seizure aura usually precedes seizure by 5-10 seconds, during which time a person still has otherwise normal neurological function. There are patients with seizure disorders (epilepsy) who still drive safely because their seizures are always

preceded by aura, and they therefore have a short period of time to safely stop before seizure onset.

Furthermore, his description of this phenomenon is not consistent with a syncope prodrome. Based on my experience, patients may describe blurred vision or tunnel vision but not color changes as Mr. Doherty described (“it just had crazy colors is what I remember”).

If I have not adequately addressed your questions and concerns at this time, please don’t hesitate to contact me.

/s/ Ryan Kirkpatrick

Ryan Kirkpatrick, MD

Board Certified Emergency Physician

Notes:

1. Availability bias or heuristic is defined by Daniel Kahneman in his book *Thinking Fast and Slow*, as “the process of judging frequency by the ease with which instances come to mind” (page 129 of the 2011 edition). When applied to medicine, this means that a sub-specialist tends to focus on their area of expertise to the exclusion of others. For example, it would be dangerous to have a cardiologist perform the initial ED evaluation of a patient with chest pain since there are many causes of chest pain that are not cardiac in nature and could be missed if the initial focus is on cardiac causes. This is the reason why the specialty of emergency medicine was created. We are trained to consider all possible systems and disease processes from the beginning to avoid missing something. We start with a broad differential and narrow it down. Here is a good example of availability bias from my personal experience. I once saw a surgeon in the ED with severe right lower quadrant pain. He came in stating, “I think I have appendicitis,” because based on his experience as a general surgeon appendicitis was the most common cause of similar pain. After a brief history and examination, I accurately concluded he was passing a kidney stone (confirmed by CT scan). He failed to consider kidney stone as a diagnosis because as a surgeon, he doesn’t diagnose or treat kidney stones. Availability bias is why the initial evaluation of a patient in the ED is best performed by a board-certified emergency physician.
2. Since finishing residency training in July 2004, I have conservatively averaged 14 shifts a month, seeing 18 patients a shift. This is 51,408 patients (17 years x 12 months/yr x 14 shifts/mo x 18 patients/shift). Studies show the prevalence of syncope in North American emergency departments to be 0.6-1.0% (Syncope in the Emergency Department, Roopinder K. Sandhu and Robert S. Sheldon: *Front Cardiovasc Med.* 2019; 6: 180). I work in a high acuity ED, so I used the high end of the range for my estimate. 1% of 50,000 is 500 patients with syncope. In addition, I conservatively estimate that for every patient diagnosed with syncope, I have seen another patient who had LOC from another cause (such as head trauma, seizure, intoxication, etc.). This is another 500 patients, for a total of 1000 patients seen for loss of consciousness.
3. As above, I have seen at least 50,000 patients. About 20% of these patients were children leaving 40,000 adults (.8 x 50,000). Men make up about half of ER patients. Using a conservative number of 20,000 men x the prevalence of OSA in men in North America of 15%-30% results in 3,000 to 6,000 men.

Citations

1. Unconscious confusion--a literature search for definitions of syncope and related disorders.Thijs RD, Benditt DG, Mathias CJ, Schondorf R, Sutton R, Wieling W, van Dijk JG. Clin Auton Res. 2005;15(1):35.
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4. Sleep apnea and commercial motor vehicle operators: statement from the Joint Task Force of the American College of Chest Physicians, American College of Occupational and Environmental Medicine, and the National Sleep Foundation.Hartenbaum N, Collop N, Rosen IM, Phillips B, George CF, Rowley JA, Freedman N, Weaver TE, Gurubhagavatula I, Strohl K, Leaman HM, Moffitt GL, Rosekind MR J Occup Environ Med. 2006;48(9 Suppl):S4.
5. Obstructive sleep apnea syndrome in the Sao Paulo Epidemiologic Sleep Study. Tufik S, Santos-Silva R, Taddei JA, Bittencourt LR. Sleep Med. 2010 May;11(5):441-6. Epub 2010 Apr 1.